Open Research Online

The Open University's repository of research publications
and other research outputs

Sharing bubbles: reflections on offline multi-surface scenarios

Conference or Workshop Item

How to cite:

Kreitmayer, Stefan; Laney, Robin; Peake, Stephen and Rogers, Yvonne (2013). Sharing bubbles: reflections on offline multi-surface scenarios. In: SOFTec Workshop, UbiComp '13 Adjunct Proceedings, 8 Sep 2013, Zurich, Switzerland, ACM, pp. 1405–1408.

For guidance on citations see FAQs.

© 2013 ACM

Version: Version of Record

Link(s) to article on publisher's website:
http://dx.doi.org/doi:10.1145/2494091.2500248

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data policy on reuse of materials please consult the policies page.

oro.open.ac.uk

Sharing Bubbles: Reflections on Offline Multi-Surface Scenarios

Stefan Kreitmayer
The Open University
Walton Hall
Milton Keynes, MK7 6AA UK
s.kreitmayer@open.ac.uk

Stephen Peake
The Open University
Walton Hall
Milton Keynes, MK7 6AA UK
s.r.peake@open.ac.uk

Robin Laney
The Open University
Walton Hall
Milton Keynes, MK7 6AA UK
r.c.laney@open.ac.uk

Yvonne Rogers
UCLIC University College London
Gower Street
London WC1E 6BT
y.rogers@ucl.ac.uk

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.
UbiComp '13, September 08 - 12 2013, Zurich, Switzerland
Copyright 2013 ACM 978-1-4503-2215-7/13/09…$15.00.
http://dx.doi.org/10.1145/2494091.2500248

Abstract
The iPad is typically perceived as a personal device, evoking the image of its owner tapping away - silently submerged in their private *digital bubble*. Here we portray iPads in a different light: Face-to-face play in groups, using connected and shared surfaces. Applying the *bubble* metaphor to multi-user cases, we ask the following questions: (a) How many people can be in one bubble together before it bursts? (b) Can multiple bubbles be connected, nested, etc. and what configurations are beneficial? (c) What design qualities are helpful in keeping beneficial bubble configurations intact and together, rather than bursting or floating away? By contrasting user observations from two multi-iPad scenarios, we illustrate the usefulness of '*bubble dynamics'* as a lens for evaluating large offline social applications. We hope to inspire discussion of future use cases, evaluation methods and design recommendations.

Author Keywords
Tablets; Shared Displays; Simulation; Offline play

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Bubble Structures and Messes

Computing technologies have enormous potential for being immersive. For example, games can keep users focused intensely, exclusively and for long time periods. Moreover, they can sometimes attract bystanders' attention and turn them into spectators, advisors or participants. This dynamic of attraction is exemplified in the phenomenon of LAN parties [6], where multiple desktop gaming takes place as socially rich, co-located experiences at home, in cafés and large events. Desktop computers with vertical screens, mice and customized keyboards are the media of choice there, as they cater to expert gamers' need for intense control. Consequently, it is not typical for players to spontaneously hand over control to bystanders. While the game is on, each player stays in his or her individual *bubble*, connected to other "*bubbled in*" players by short cable, talk, sometimes occasional eye contact, shared game expertise, cultural affinities and sometimes friendship. An event for insiders, the LAN party itself can be seen as a *superbubble*, comprising players and spectators (Figure 1, bottom part).

By contrast, the line between participation and spectatorship is not always that clear and static when using shareable interfaces. For example, Brignull and Rogers [1] analyzed how groups of people approached an interactive public display. They describe three modes of group activity: peripheral attention, focal attention and direct interaction with the interface. Groups and individuals were observed transitioning between these modes by crossing certain *thresholds* and moving in the space. While the thresholds model works as described for a single device, things can get more complex with multi-device applications. In such settings a group or individual can, e.g., interact directly with one interface, while at the same time peripherally attending another interface, resulting in users encountering a *mix of thresholds*. This mix can get especially complex and dynamic in large multi-user, multi-surface applications.

As surfaces are designed for easy sharing, with the intention to keep the threshold to participation low, people can move between surfaces, join groups, form new groups, change roles, and sometimes also change the position or orientation of the devices. Finally, the applications themselves may involve switching between small-group and large-group attention, further adding to the socio-technical complexity of the situation.

Figure 1 contrasts the well-defined, relatively static *bubble structure* of LAN parties with the dynamic *bubble mess* of multi-user, multi-surface applications.

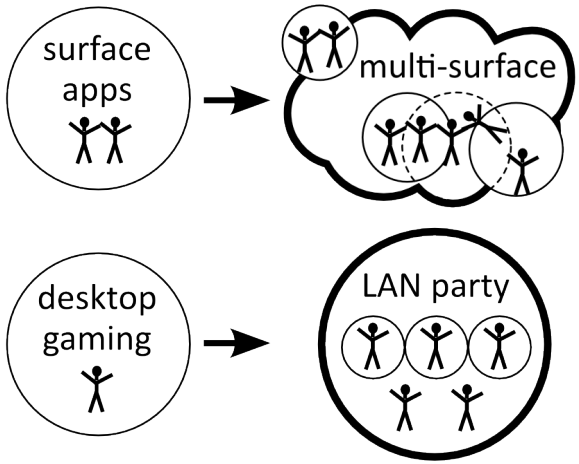

Figure 1: A multi-surface app is to a surface app what a LAN party is to desktop gaming. ...only messier.

Bubbles in Multi-Surface Applications

Next we describe two cases, based on applications we designed and evaluated. Both are classroom simulations of real problems, in which 20-30 students take part simultaneously. Using shared tablets and wall displays, the activity switches between small-group negotiation and whole-class discussion while a teacher controls the timing. Both applications are structurally similar but differ by simulated topic (and therefore user group) and the number of tablets and displays. The design goal was to encourage verbal face-to-face engagement, rather than face-to-screen.

Case Study 1: 4Decades

The 4Decades simulation [4] was designed to encourage managers from different cultural and professional backgrounds to negotiate climate spending. Comprising 8 tablets and 3 wall displays, it was trialed in four executive training workshops.

Figure 2: One of two teams/planets in 4Decades. With 4 tablets per team, decisions are initially discussed in pairs at the tablets. Focal attention is on the tablets, including spectators.

Figure 3: Later the focus shifts to discussing as a team across the table, as participants consider more global perspectives.

The main findings were: (a) Pairs shared tablets equitably. Sharing drove discussion and engagement. (b) Initially, pairs were bubbled together. Collaboration expanded to include the whole table, later both tables: Bubbles within bubbles. (c) Spectators floated, advising different groups, rarely crossing the threshold to touch.

Case Study 2: UniPad

Designed to encourage pre-university students to discuss personal spending behavior, UniPad [5] runs on 4 tablets and a classroom projector/whiteboard. It was trialed in youth centers and classrooms, achieving unusual levels of engagement and on-topic discussion.

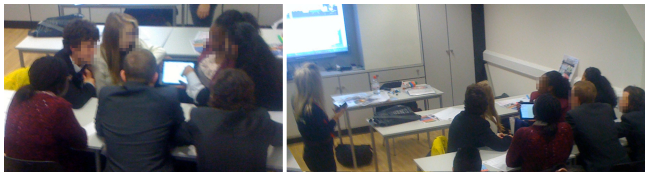

Figure 4: A group of 7 sharing a tablet (left) and looking up to the wall display (right) as the teacher (center) switches the application from interactive mode to classroom-debate mode.

New findings: (a) Up to 7 could share one iPad-bubble. (b) Bubble structure was static: No need to walk or talk across the room, as groups relied on the public display to stay aware of what the other groups were doing.

Discussion

There can be many different ways of being in a digital bubble. The number seems to increase with the diversity of computing devices [7] and their possible configurations. In the studies described above, we observed several types that we had not seen before and there are probably more possible.

What's special here is the hands-off, face-to-face immersion. This was achieved by introducing additional thresholds in the design, while mitigating others. Our full paper presented at this conference [5] goes into detail on how the design successfully encouraged sharing and achieved a very low threshold to verbal participation, by avoiding excessive screen interaction. This is an important design aspect because even very polite individuals can have a surprising tendency to get *bubbled in* by exciting situations on the screen, causing them to tap away instead of acting collaboratively.

Our analysis suggests that *bubbles and thresholds* are a useful pair of metaphors for analyzing participation in social offline encounters mediated by technology. This includes multi-surface scenarios and potentially also other areas of co-located computing where space matters, e.g., augmented reality games and ubicomp groupware.

Far from trying to provide a full-fledged theory, *bubbles and thresholds* might give us an easy-to-use analytical lens that can be used on its own or complemented with established spatial frameworks, such as F-formations [3] and Proxemics [2]. We would argue that *bubbles and thresholds* contributes the following benefits:

1. A generic container metaphor (the bubble)
2. A small but powerful set of verbs to describe macro-level transitions, such as: burst, float, merge, split, cross, expand, swallow…
3. A focus on attention, intention and transition
4. Topical connotations regarding sociality and isolation in the context of digital cultures

Acknowledgements

We thank the participants in our studies. This research was funded by the Open University.

References

[1] Brignull, H. and Rogers, Y. Enticing people to interact with large public displays in public spaces. *Proceedings of INTERACT*, (2003), 17–24.

[2] Greenberg, S., Marquardt, N., Ballendat, T., Diaz-Marino, R., and Wang, M. Proxemic interactions: the new ubicomp? *interactions* 18, 1, ACM (2011).

[3] Kendon, A. *Conducting interaction: Patterns of behavior in focused encounters.* CUP Archive, 1990.

[4] Kreitmayer, S., Rogers, Y., Laney, R., and Peake, S. From Participatory to Contributory Simulations: Changing the Game in the Classroom. *Proceedings of CHI '12*, ACM, (2012).

[5] Kreitmayer, S., Rogers, Y., Laney, R., and Peake, S. UniPad: Orchestrating Collaborative Activities Through Shared Tablets and An Integrated Wall Display. *Proceedings of UBICOMP '13*, ACM (2013).

[6] Taylor, T.L. and Witkowski, E. This is how we play it: what a mega-LAN can teach us about games. *Proc. of FDG*, ACM (2010), 195–202.

[7] Weiser, M. The Computer for the 21st Century. *Scientific American* 265 (1991), 94--102.